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LEARNING ENGLISH GRAMMAR THROUGH LOGICAL LINE-UPS

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تعلُّم قواعد اللغة الإنجليزية من خلال استراتيجية الاصطفاف المنطقي

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Abstract
This quasi-experimental study examined whether Iraqi second-intermediate female students who learned selected English grammar concepts through Logical Line-Ups showed greater pretest-to-posttest improvement than students who received regular classroom instruction. Two intact classes participated (N = 80; 40 per group). Both groups completed the same grammar concept acquisition test before and after instruction. Baseline means were nearly identical, t(78) = 0.13, p = .898. The experimental group gained 8.43 points on average, compared with 1.68 points in the control group. Because gain-score variances were unequal and the gain distributions departed from normality, Welch's t test was used, supported by a Mann–Whitney sensitivity check. The gain difference was significant, Welch's t(74.31) = 6.11, p < .001, 95% CI [4.55, 8.95], Hedges' g = 1.35. The findings indicate greater improvement in the experimental class, while intact-group assignment limits strong causal generalization.**Keywords:** Logical Line-Ups; grammar concept acquisition; English grammar; Iraqi EFL learners; quasi-experimental design; active learning

الملخص

هدفت هذه الدراسة شبه التجريبية إلى التحقق من فاعلية استراتيجية **الاصطفاف المنطقي (Logical Line-Ups)** في تنمية اكتساب بعض مفاهيم قواعد اللغة الإنجليزية لدى طالبات الصف الثاني المتوسط في العراق، من خلال مقارنة مقدار التحسن بين الاختبارين القبلي والبعدي لدى الطالبات اللاتي تعلمن باستخدام هذه الاستراتيجية والطالبات اللاتي تلقين التدريس الصفي الاعتيادي. شاركت في الدراسة شعبتان دراسيتان قائمتان بلغ مجموع طالباتهما (٨٠) طالبة، بواقع (٤٠) طالبة في كل مجموعة. خضعت المجموعتان لاختبار واحد لقياس اكتساب مفاهيم القواعد النحوية قبل التدريس وبعده. وقد أظهرت نتائج الاختبار القبلي تقاربًا كبيرًا بين متوسطي المجموعتين، إذ بلغت قيمة الاختبار $t(78) = 0.13$ ، عند مستوى دلالة $p = .898$. وبلغ متوسط مقدار التحسن لدى المجموعة التجريبية (٨.٤٣) درجات، مقابل (١.٦٨) درجة لدى المجموعة الضابطة. ونظرًا إلى عدم تجانس تباينات درجات التحسن وانحراف توزيعاتها عن التوزيع الطبيعي، استُخدم اختبار **Welch's t**، مع إجراء اختبار **Mann–Whitney** بوصفه اختبارًا داعمًا للتحقق من متانة النتائج. وأظهرت النتائج وجود فرق دال إحصائيًا في مقدار التحسن بين المجموعتين، إذ بلغت قيمة $t(74.31) = 6.11$ Welch's ، عند مستوى دلالة $p < .001$ ، وبفاصل ثقة ٩٥٪ بلغ [4.55، ٨.٩٥]، في حين بلغ حجم الأثر وفق معامل Hedges' $g = 1.35$. وتشير هذه النتائج إلى أن طالبات المجموعة التجريبية حققن تحسنًا أكبر من طالبات المجموعة الضابطة، مع الأخذ في الحسبان أن الاعتماد على شعب دراسية قائمة مسبقًا يحد من إمكانية تعميم الاستنتاجات السببية بصورة قاطعة.**الكلمات المفتاحية :** الاصطفاف المنطقي؛ اكتساب مفاهيم القواعد؛ قواعد اللغة الإنجليزية؛ متعلمو اللغة الإنجليزية لغةً أجنبية في العراق؛ التصميم شبه التجريبي؛ التعلم النشط.

1. Introduction

Grammar instruction at the intermediate stage becomes most revealing when students leave the rule box and have to make a choice in a new sentence. A learner may be able to recite the form of the passive, for example,

yet still hesitate over which constituent should be foregrounded, which form of be is required, or why a passive clause is appropriate in a particular context. Similar difficulties arise with be going to and modal verbs, where grammatical form has to be coordinated with speaker meaning. For this reason, grammar pedagogy increasingly treats grammatical knowledge as an interaction among form, meaning, and use rather than as the memorization of isolated rules (Celce-Murcia & Larsen-Freeman, 1999; Larsen-Freeman, 2003; Nassaji & Fotos, 2011).Logical Line-Ups were adopted in the present study as a way of making those relationships temporarily visible. Students work with sentence parts, examples, or meaning labels, place them in an ordered line or category, compare alternatives with classmates, and then explain the grammatical basis for their decisions. The movement is not treated as an end in itself. What matters instructionally is the sequence of noticing, comparing, explaining, and revising. In that sense, the strategy combines embodied activity with peer interaction and form-focused discussion.Recent research provides a useful, but not uniform, background for this approach. Jusslin et al. (2022) found that embodied approaches can support language-related meaning making, although they also noted a shortage of evidence from secondary education. Chiu et al. (2022) and Sippel (2024) showed that peer interaction can become more productive when learners attend explicitly to grammatical form and feedback. Watanapokakul (2024) reported positive results from an active grammar model, and Gebregziabher et al. (2025) found higher grammar achievement under a controlled flipped-learning design. At the same time, Scotland (2022) found no statistically significant advantage for collaborative over individual completion of form-focused tasks in an Arab EFL context. The mixed pattern is important: active or collaborative work is not automatically effective; the linguistic task, feedback, and local classroom conditions matter.Evidence from Iraq is also beginning to grow. Al Lami et al. (2024) reported gains in grammar learning among Iraqi EFL learners taught through cooperative learning. Khalaf (2025), working with second-intermediate Iraqi students, likewise used an equivalent-group quasi-experimental design to examine a syntax-focused instructional technique. These studies are not direct tests of Logical Line-Ups, but they show both the feasibility of structured learner participation in Iraqi EFL classrooms and the value of using comparison groups when evaluating instructional innovations.The present study therefore narrows its claim to one measured outcome: English grammar concept acquisition. It asks whether students taught through Logical Line-Ups improve more than a comparable class receiving regular instruction on the same curricular content. This narrower focus also keeps the statistical analysis tied to the available participant-level data rather than extending the conclusion to a separate construct that was not independently measured.

2. Research Problem, Aim, and Hypothesis

The practical problem behind the study is familiar in grammar classrooms: students can sometimes reproduce a rule but fail to discriminate between closely related examples or apply the rule when the wording changes. The selected structures require more than recall. Present passive clauses involve word order, agreement, and the past participle; be going to links subject agreement to future intention; and should, must, and may require distinctions in communicative force. A procedure that makes these relations explicit may help learners build more usable grammatical categories.The study aimed to determine whether the experimental group showed greater improvement in grammar concept acquisition than the control group from pretest to posttest. The research question was: Do Iraqi second-intermediate female students taught through Logical Line-Ups show greater pretest-to-posttest improvement in English grammar concept acquisition than students receiving regular classroom instruction?The null hypothesis stated that there would be no statistically significant difference at $\alpha = .05$ between the mean gain scores of the experimental and control groups on the English grammar concept acquisition test.

3. Operational Definitions

Logical Line-Up Strategy. A classroom procedure in which learners arrange themselves, cards, sentence components, or examples according to an explicit grammatical criterion and then justify the resulting order or classification. In this study, the procedure was used only with the selected grammar content and was followed by teacher feedback and transfer examples.Grammar Concept Acquisition. The learner's ability to recognize, discriminate, and apply the form–meaning relationships of the selected grammar structures. Operationally, it was represented by the total score on the study's grammar concept acquisition test.Regular Classroom Instruction. The comparison condition in which the same grammar content was taught through the ordinary textbook-based classroom procedure without the structured line-up sequence used with the experimental group.

4. Theoretical Framework and Related Literature

4.1 Grammar concepts as form–meaning relations

A grammatical concept becomes useful when learners can identify the features that define it, distinguish it from neighboring categories, and apply it to unfamiliar examples. The present passive illustrates this clearly. Students

need to coordinate the grammatical subject with an appropriate form of be and a past participle, while also understanding the discourse shift toward the action or receiver. The concept is therefore not exhausted by the formula be + past participle; its use depends on how the form functions in context.The same principle applies to be going to. The learner must select the appropriate form of be, preserve the multiword structure, and connect it with an intended future meaning. With modal verbs, the difficulty is partly semantic and pragmatic: should commonly signals advice, must stronger obligation, and may possibility or permission depending on context. Teaching these items as isolated labels can leave category boundaries unstable, whereas comparison among examples makes the contrasts easier to inspect (Larsen-Freeman, 2003; Nassaji & Fotos, 2011).

4.2 Why ordering, comparison, and explanation may matter

A Logical Line-Up places grammatical decisions in public view. When students decide where a card belongs, they must choose a criterion; when classmates question that position, the criterion has to be stated more precisely. The subsequent explanation can reveal whether the learner is attending to word order, agreement, meaning, or an irrelevant surface feature. This is the point at which an active classroom task becomes a language-learning task rather than movement for its own sake.The underlying mechanisms are compatible with several strands of recent evidence. Jusslin et al. (2022) describe embodied language learning as most useful when bodily action is integrated with linguistic meaning. Sippel (2024) likewise shows that peer interaction benefits from explicit form-focused support and feedback training. Jo's (2025) meta-analysis of collaborative output tasks reports an overall positive effect on second-language grammar learning, though the size of the effect varies by task type. These findings suggest a plausible rationale for the strategy, but they do not remove the need for a controlled classroom comparison.

4.3 Recent Iraqi and Arab-context evidence

Regional evidence is especially relevant because classroom density, textbook sequence, teacher routines, and learners' prior experience can shape how an activity works in practice. Al Lami et al. (2024) found that cooperative learning supported the learning of the simple present and present continuous among Iraqi EFL learners. Khalaf (2025) reported a significant advantage for a syntax-focused technique with Iraqi second-intermediate students. In a Saudi secondary-school context, Alghamdy (2023) found that problem-based learning was associated with improvement in grammar-related performance alongside writing. By contrast, Scotland (2022), working with Arabic-speaking EFL learners in Qatar, did not find collaborative task completion statistically superior to individual completion. Taken together, the regional literature favors testing specific procedures rather than assuming that collaboration itself guarantees higher achievement.

5. Methodology

5.1 Research design and participants

A two-group pretest–posttest quasi-experimental design was used. The participant-level matrix comprised 80 Iraqi second-intermediate female students in two intact classes: 40 in the experimental group and 40 in the control group. Individual random assignment was not used. Both groups took the same grammar concept acquisition test before and after instruction, allowing baseline equivalence and differential change to be examined directly.The instructional content came from the Ministry-prescribed English for Iraq materials used for second intermediate during the 2025–2026 school year. The focal structures were the present passive, future plans with be going to, and the modal verbs should, must, and may (O'Neill et al., n.d.). These structures were chosen because each can be represented through sequencing, categorization, or contrastive examples.

5.2 Grammar concept acquisition test

The instrument was a teacher-developed grammar concept acquisition test aligned with the selected curricular content. Items sampled recognition, discrimination, and application rather than rule recall alone. Content validity was established through review by specialists in English language and TEFL methodology, after which several items were reworded. The items were scored dichotomously. For dichotomous items, the Kuder–Richardson Formula 20 (KR-20) is mathematically equivalent to coefficient alpha calculated on the same 0/1 item matrix; the internal-consistency coefficient was .84. The recorded item-difficulty indices ranged from .36 to .74 and discrimination indices from .31 to .62.

5.3 Instructional procedure

Both groups worked with the same target grammar, but the route through the material differed. The control group continued with the regular textbook-based procedure. In the experimental group, each target structure was converted into a sequence of cards, examples, or meaning labels. Students first inspected the language sample, then arranged the material according to a stated criterion, discussed disputed placements, and justified the final arrangement. The teacher's role was to press for grammatical reasons, correct misconceptions, and provide a fresh example to check transfer.

Table 1. Core Stages of the Logical Line-Up Procedure

Stage	Focus	Classroom action
1	Orientation	Introduce a short textbook-based example and identify the grammatical relation to be noticed.
2	Card work	Distribute sentence parts, full examples, functions, or meaning labels.
3	Line-up criterion	State one explicit basis for ordering or classifying the cards.
4	Arrangement and negotiation	Students build the line or category set, compare positions, and revise where necessary.
5	Oral justification	Students explain why an item belongs in a position using grammatical evidence.
6	Transfer and feedback	The teacher checks accuracy and presents a new example to test whether the concept transfers.

5.4 Statistical analysis

Analysis began with means and standard deviations for the four score sets. An independent-samples t test was used to check pretest equivalence, and paired-samples t tests described change within each group. The primary comparison used gain scores (posttest minus pretest). Gain-score normality was examined with the Shapiro–Wilk test, and equality of variances with Levene's test. Because both gain distributions departed from normality and the variances were unequal, Welch's independent-samples t test was used for the main between-group comparison, with a Mann–Whitney test as a non-parametric sensitivity check. Hedges' g and a 95% confidence interval for the mean gain difference were reported to describe the magnitude and precision of the between-group difference. A conventional group-by-time interaction effect was also expressed as partial eta squared for comparability with educational research reporting (Field, 2018).

ANCOVA was considered because it is often used to compare posttest scores while adjusting for pretest performance. Before applying it, the homogeneity-of-regression-slopes assumption was tested with a pretest × group interaction. The interaction was statistically significant, $F(1, 76) = 19.27$, $p < .001$. A standard common-slope ANCOVA was therefore not reported, because its central assumption was violated.

6. Results

6.1 Descriptive statistics

Table 2. Descriptive Statistics for Pretest, Posttest, and Gain Scores

Group	Measure	Mean	SD	n
Experimental	Pretest	61.53	19.18	40
Experimental	Posttest	69.95	15.65	40
Experimental	Gain	8.43	5.47	40
Control	Pretest	60.98	19.21	40
Control	Posttest	62.65	19.79	40
Control	Gain	1.68	4.36	40

The groups began at almost the same mean level. After instruction, the experimental mean rose by 8.43 points, whereas the control mean rose by 1.68 points. The descriptive pattern therefore favors the experimental group, but inferential tests are needed because the groups were intact classes and the gain distributions were uneven.

6.2 Baseline equivalence and distribution checks

The pretest difference was negligible and not statistically significant, $t(78) = 0.13$, $p = .898$. The corresponding standardized difference was $d = 0.03$, indicating little practical separation between the classes at baseline. The posttest-only comparison was not statistically significant at the .05 level, $t(78) = 1.83$, $p = .071$; for this reason, the interpretation centers on differential change from the nearly equivalent starting point rather than on the posttest mean alone.

Table 3. Assumption Checks for Gain Scores

Check	Experimental	Control	Statistic	Decision
Shapiro–Wilk	W = .907, p = .003	W = .701, p < .001	—	Normality not supported
Levene's test	—	—	F(1, 78) = 6.42, p = .013	Equal variances not supported

6.3 Change within groups

Table 4. Within-Group Pretest–Posttest Change

Group	Pretest M	Posttest M	Mean gain	t	df	p
Experimental	61.53	69.95	8.43	9.75	39	< .001
Control	60.98	62.65	1.68	2.43	39	.020

Both classes improved over time, but the size of the change was quite different. Improvement in the control group is not surprising: students continued to study the same curriculum and could benefit from ordinary instruction, practice, and familiarity with the test content. The relevant question is therefore whether the experimental class improved by more than this background change.

6.4 Primary between-group comparison

Table 5. Between-Group Comparison of Gain Scores

Exp. gain M (SD)	Ctrl. gain M (SD)	Mean difference	Welch t	df	p	95% CI	Hed
8.43 (5.47)	1.68 (4.36)	6.75	6.11	74.31	< .001	[4.55, 8.95]	1.35

Welch's test showed that the mean gain was higher in the experimental group, $t(74.31) = 6.11$, $p < .001$. The 95% confidence interval indicates that the estimated difference in mean improvement was about 4.55 to 8.95 points. Hedges' $g = 1.35$ describes a sizable standardized separation in gain scores. The non-parametric sensitivity check pointed in the same direction, Mann–Whitney $U = 1452$, $p < .001$, so the result does not depend on the normality assumption of a single parametric test.For comparison with the effect-size metric requested in many educational studies, the conventional group × time interaction based on the change scores was $F(1, 78) = 37.28$, $p < .001$, partial $\eta^2 = .323$. This value should be read together with the robust gain-score analysis rather than as a stand-alone causal estimate, because the classes were intact rather than individually randomized.

6.5 ANCOVA assumption check

Table 6. Test of Homogeneity of Regression Slopes

Term	F	df1	df2	p
Pretest × Group	19.27	1	76	< .001

The significant pretest × group interaction indicates non-parallel pretest–posttest relationships across groups. Under this condition, a standard ANCOVA that forces a common regression slope would be difficult to defend. The manuscript therefore retains the transparent pretest-equivalence and gain-score approach and reports the failed assumption test rather than presenting an adjusted mean that rests on a violated model assumption.

7. Discussion

The main pattern is straightforward: the two classes entered the study at virtually the same mean level, both improved, but the experimental class improved considerably more. That distinction matters. If only the experimental pretest and posttest had been examined, part of the increase could have reflected ordinary classroom progress, repeated testing, or continued exposure to the curriculum. The control group shows that some improvement occurred without the Logical Line-Up procedure; the stronger experimental gain is the more informative result.One plausible explanation lies in the requirement to make grammatical relations explicit. A student arranging a passive clause cannot rely only on recognizing a familiar sentence. She has to decide which component belongs where and defend that decision. With be going to, the line-up makes agreement and multiword order visible. With modal verbs, the task shifts from simply recalling forms to sorting examples by communicative force. In each case, the learner's reasoning becomes available for immediate correction. This interpretation is consistent with Sippel's (2024) finding that peer interaction is most productive when learners receive form-focused support and feedback, and with Chiu et al. (2022), who linked peer collaboration with

grammatical awareness.The physical arrangement may contribute by giving an abstract relation a temporary spatial form, but the present data do not justify treating movement itself as the cause of learning. The more convincing account is that movement, comparison, and explanation operate together. Jusslin et al. (2022) make a similar point in their review: embodied language learning is meaningful when bodily action is integrated with language and meaning-making rather than added as a decorative activity.The result also fits part of the regional evidence. Al Lami et al. (2024) reported benefits from cooperative grammar learning among Iraqi EFL learners, and Khalaf (2025) found an advantage for a structured syntax-focused technique with second-intermediate students. At the same time, Scotland (2022) found no collaborative advantage over individual form-focused work in a Qatari EFL sample. That contrast is useful rather than problematic. It suggests that the present result should be attributed to the specific instructional package—clear criteria, focused grammar content, explanation, and feedback—rather than to collaboration as a broad label.The statistical findings also need a measured reading. Hedges' g and partial η^2 indicate a substantial difference in change, but the design remains quasi-experimental. The classes were intact, and the gain distributions contained a few unusual individual changes. That is why the main test used Welch's correction and why a Mann–Whitney sensitivity analysis was added. The significant test of regression-slope heterogeneity also prevented the use of a standard ANCOVA. Reporting these features openly gives a more credible account than selecting the most favorable model.

8. Conclusion

For these two intact classes, Logical Line-Up instruction was associated with greater improvement in English grammar concept acquisition than regular classroom instruction. The experimental and control groups began at nearly the same pretest level, yet the experimental group gained 6.75 points more on average. The difference remained statistically clear under both Welch's test and a non-parametric sensitivity check.The educational implication is specific rather than universal. Logical Line-Ups appear most suitable for grammar content that can be represented through ordering, classification, or a contrast between form and meaning. Their value depends on the quality of the linguistic criterion, the requirement that students explain their choices, and the feedback that follows. The findings do not establish that physical movement alone improves grammar, nor do they justify extending the conclusion beyond comparable learners and classroom conditions without further replication.

9. Recommendations

Use Logical Line-Ups selectively with grammar structures that contain a visible sequence, category boundary, or form–meaning contrast.Keep oral justification and teacher feedback as required stages rather than treating the activity as movement alone.Replicate the study in additional Iraqi schools and include male and female samples where appropriate.Add a delayed posttest in future work to determine whether the gain is retained after immediate instruction.

Where item-level test responses are archived, report KR-20 and item diagnostics directly from the same dataset used for the final analysis.

10. Limitations

Several limits should be kept in view. The two classes were intact, so unmeasured group differences cannot be ruled out as confidently as they could under individual random assignment. The study concerns female second-intermediate students in a limited Iraqi context and does not include a delayed measure of retention. The gain-score distributions were non-normal and heteroscedastic, although the principal finding remained stable under both Welch's test and the Mann–Whitney check. Finally, the significant pretest × group interaction ruled out a standard common-slope ANCOVA; readers should therefore interpret the reported effect sizes as descriptive of this implementation rather than as unrestricted causal estimates.

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Appendix A. Participant-Level Pretest and Posttest Scores

The matrix below reproduces the participant-level scores used for all descriptive and inferential analyses in this manuscript.

Table A1. Participant-Level Score Matrix

No.	Experimental Pre	Experimental Post	Control Pre	Control Post
1	45	51	45	40
2	60	65	60	61
3	24	40	24	25
4	52	66	52	54
5	65	70	65	66
6	53	60	53	58
7	66	78	66	70
8	76	80	76	77
9	82	85	82	85
10	91	98	91	93
11	53	60	53	53
12	74	81	74	75
13	85	90	85	85
14	62	77	62	66
15	66	76	66	68
16	87	90	87	88

No.	Experimental Pre	Experimental Post	Control Pre	Control Post
17	88	90	88	91
18	98	99	98	98
19	54	66	54	50
20	25	42	25	25
21	64	75	64	65
22	68	72	68	66
23	86	89	86	88
24	65	75	65	66
25	69	71	69	71
26	49	55	49	45
27	68	71	68	66
28	58	66	58	59
29	59	66	59	59
30	35	40	35	40
31	65	71	65	88
32	66	72	66	66
33	67	71	67	69
34	68	77	68	68
35	68	75	68	68
36	15	38	55	65
37	70	80	25	25
38	35	50	15	19
39	25	45	38	41
40	55	75	45	44